AGFA-GEVAERT

AGFACONTOUR

PROFESSIONAL

in photographics

Cover photo:

Reclining nude, photo by Dr. Gerhard Graeb
Agfapan 100 Professional, $2^1/_4$ x $2^1/_4$ format derivative from Agfacontour Professional-combines 1st order equidensity, 2nd order equidensity and mask copied through colour filters onto Agfachrome 50 L Professional.

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Correction

We regret to inform of a printing error
in Fig. 5 on page 13.

The original negative does not show halftones.

For the correct tonal values of the original,
please see Fig. 6 on page 11 or 14.

Contents

THEORY

PRACTICE

Photo on page 7

A 1st oder family of equidensities was prepared from a black and white negative and exposed on Agfacolor paper MCN 111 by copying through colour filters.

Note:

The times and particulars of filters given in the illustrations should only be regarded as relative values as the illumination systems of printers normally differ very considerably.

Agfacontour Professional Film is a new kind of photographic material that differs in some essential features from normal photographic films. It has been specially developed for equidensitometry – a scientific method of evaluating photographs, e. g. in astronomy or lighting and illumination techniques. Agfacontour film is chiefly used in the scientific field where it greatly simplifies many measuring methods.

Apart from the scientific aspect, the images resulting from equidensities obtained from Agfacontour have a striking graphical and aesthetic impact. This is also one reason why Agfacontour Professional Film will develop, over and above its scientific application, into a new means of composition in photographics.

Agfacontour Professional Film opens up new possibilities for composition in commercial art by the use of abstraction and restriction of the subject matter to a few lines or areas.

The aim of this booklet is to provide photographers, graphic artists and any interested amateur photographers with full details of the principle, processing and application of Agfacontour film.

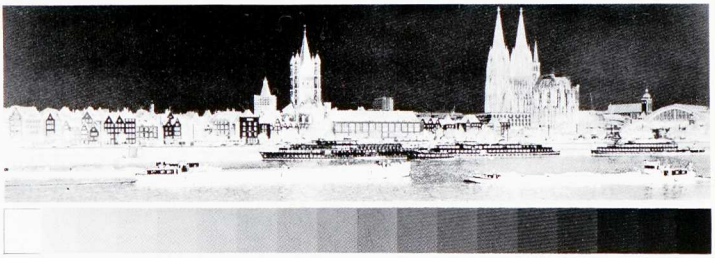
What are equidensities?

In photography equidensities are the places of equal density in a photographic original.
This can best be illustrated by the following example.
The density of an original is measured point by point with a densitometer and the points of equal density joined by a line. This has the effect of breaking down the image in much the same way as contours are used in cartography and isobars or isotherms in meteorology.
The equidensities of a photographic original can be rendered visible by copying on Agfacontour film.
Equidensities reproduced by Agfacontour film are classified according to equidensity width, equidensity position, generations and families of equidensities.
These terms will be explained and illustrated for the practical worker on the following pages. In Figures 1–6 a step-wedge and test negative are used to show what equidensities are, the extent to which they can be produced and how they can be influenced. The step-wedge is particularly suitable for recognizing the laws of equidensity formation while the illustration clearly shows the practical worker the pictorial effect of the individual equidensity stages.

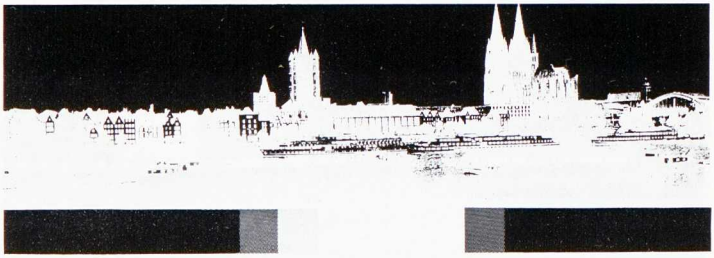
Equidensity width

In actual fact the exact description is equidensity definition but the expression equidensity width is used here to avoid the risk of confusion with optical terminology.
Equidensity width refers to the density range of the original covered by the film. This width can be altered by the use of yellow filters (see Fig. 2).
The bigger the filter factor, the narrower will the equidensity be whereas the equidensity can be widened with a magenta filter.

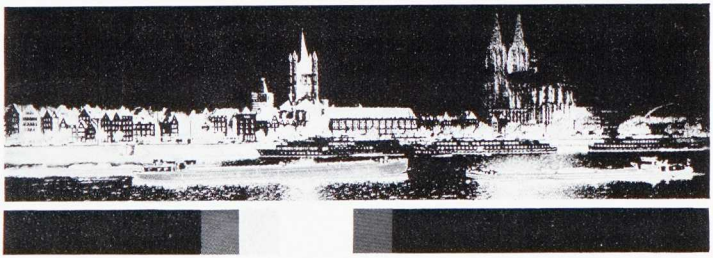
Fig. 2 Equidensity width



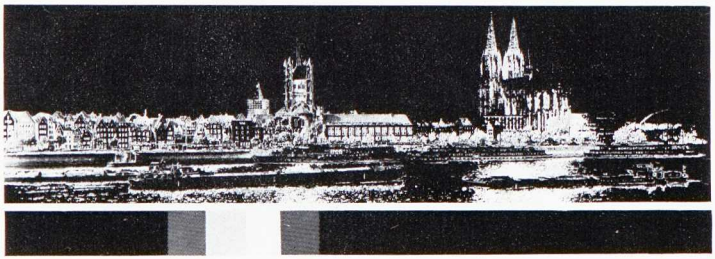
Original



without yellow filter
– – –



80 – –



120 – –

Equidensity position

The position of an equidensity can be changed within the density range of an original by altering the exposure (see Fig. 4). There is a regular association between the density of the original at which the equidensity should appear and the exposure required. The following example may serve to illustrate this. If the equidensity is obtained with an exposure of 1 sec. at a density of 1.0 in the original a 10 sec. exposure will have to be given to obtain the equidensity at density 2.0 in the original. At a density 3.0 in the original the exposure would have to be 100 sec.

First, second and third order equidensities

Equidensities should be defined uniformly in the following manner:
A first order equidensity is obtained when the original (a negative, positive, black and white or colour) is copied on Agfacontour Professional Film.
Areas result in first order copies but lines may also result, depending on contrast of the original, chance arrangement of the areas of grey in relation to each other, and the yellow filter used. Lines are formed in first order equidensities if two densities are adjacent and lie outside the density range in which the equidensity originates. In this respect one density must come from section a and one density from section b, as shown in the illustration. At the point of contact a narrow equidensity forms in the copy on Agfacontour, the two densities themselves appearing completely black. If, on the other hand, two different densities from region a or region b meet they are reproduced in blackened form and without an equidensity line.

Fig. 3

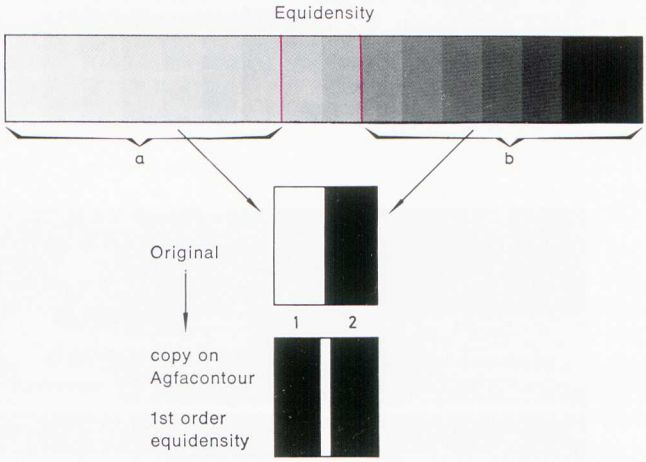
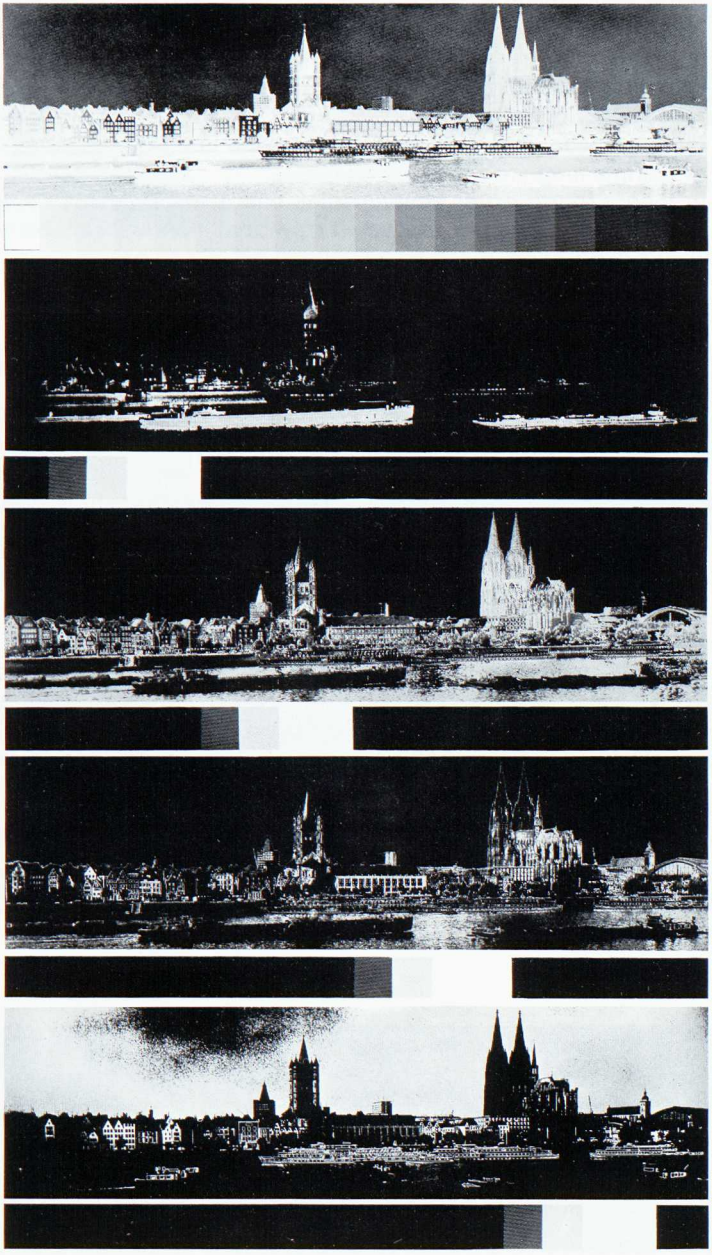


Fig. 4 Equidensity position



Original

Filtering
100 – –
Exposure
1 sec

100 – –
4 sec

100 – –
16 sec

100 – –
72 sec

If the first order equidensity is again copied on Agfacontour film a second order equidensity is obtained. In this case only fine lines result, that is to say "outlines" which delimit the former areas of grey in much the same way as a line drawing.
If the second order equidensity is copied again on Agfacontour a third order equidensity is formed. The single line is then transformed into a double line. By then these lines are usually already so fine that they can only be detected by using a magnifier (see Fig. 5).
In theory fourth order equidensities can also be produced but the four lines resulting in this case are so narrow that they cannot be reproduced with visible separation until they have been greatly enlarged.

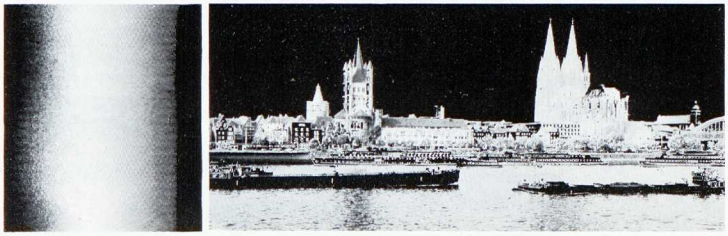
Family of equidensities

For many applications it is wished to reproduce on the final enlargement not only one but a number of equidensities of various density ranges, known as families of equidensities. In this respect the equidensities can be correlated in such a way that they are separated, adjoining or overlapping. In the latter case additional equidensities form at the points where they overlap (see Fig. 6).
The following example is intended to show how the position of the equidensity within a density range can be controlled by the exposure and filtering:
Filtering: 150 yellow (colour temperature of illumination 2600° Kelvin)
Basic exposure: one second for density 0–0.3 of the original
Extent of the equidensity: density 0.3
If, in this example, the exposure is increased to 2 sec. the density range 0.3–0.6 is covered, at 4 sec. the range 0.6–0.9, at 8 sec. the range 0.9–1.2. In other words the exposure is altered by the factor 2.
If, on the other hand, the exposure factor is reduced to 1.5, the equidensities will overlap and at factor 3 they will be reproduced separately.
An exposure factor of 2 is taken as a basis with an equidensity width of 0.3 density units, as in our example. With an equidensity width of 0.2 the exposure is increased by the factor 1.6 and, with a width of 0.4, by the factor 2.5 if the equidensities should meet.

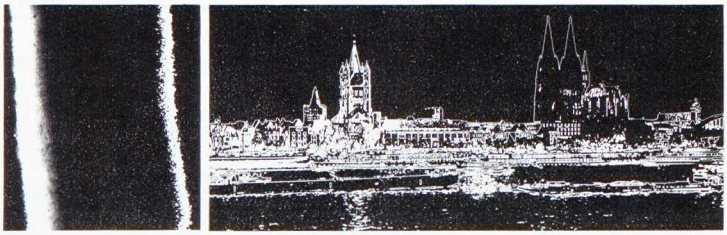
Fig. 5 First, second and third order equidensities

Original

1st order equidensity



2nd order equidensity



3rd order equidensity

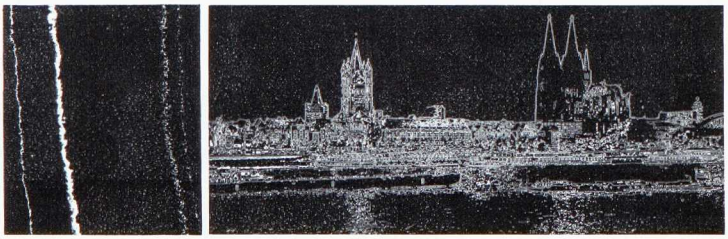
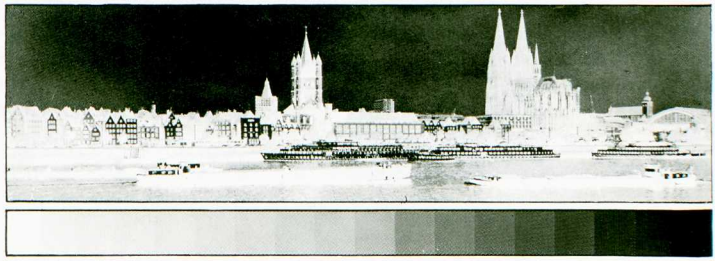
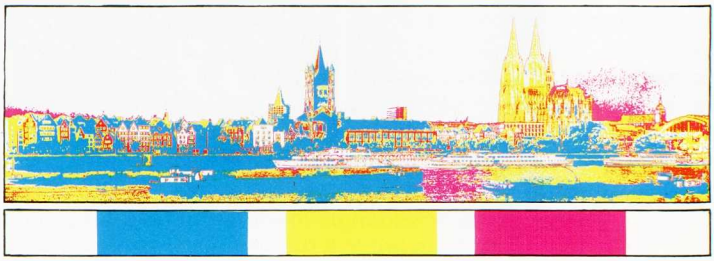


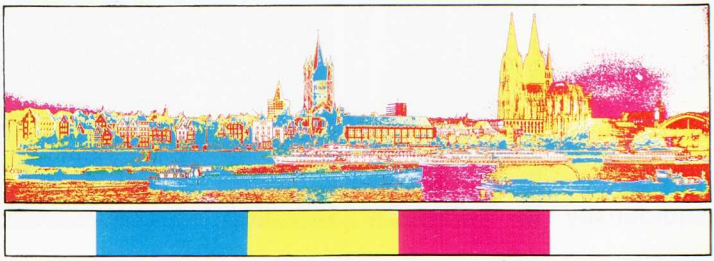
Fig. 6 Family of equidensities



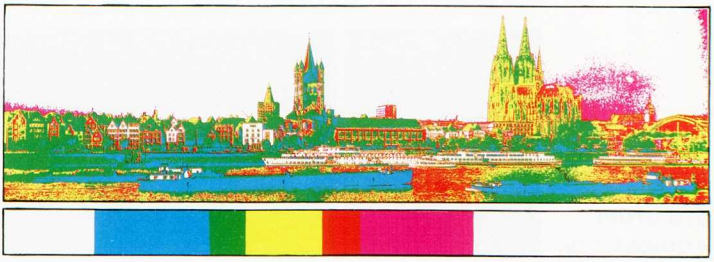
Original



separated equidensities



adjoining equidensities

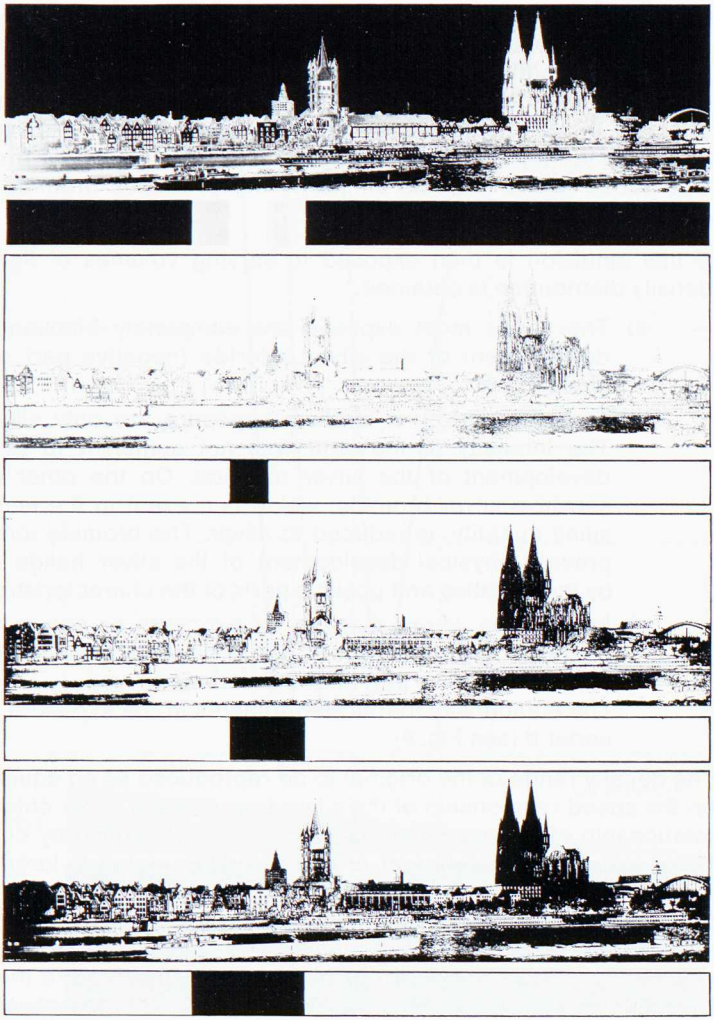


overlapping equidensities

Altering equidensity width when recopying

Despite their very hard gradation the flanks of the equidensities cover a small number of grey tones (see page 17). In this way the width of equidensities can be controlled to a slight extent (see illustration) when recopying on hard paper or film such as Agfa-Gevaert Gevalith Ortho 081 p and Gevaline N 51 p (see appendix). In the case of families of equidensities this also makes it possible to correct the width of the individual equidensities without having to make further copies on Agfacontour film.

Fig. 7



How do equidensities originate?

The foundation for the production of Agfacontour film was the bromide ion diffusion process discovered at the Agfa Leverkusen laboratory in 1949. By this method a positive copy is made from an original positive by a direct process of physical development. Agfacontour film consists of a mixed emulsion containing silver chloride and silver bromide which enables formation of the equidensity by means of combined chemical and physical development. The details of the process are as follows:

A chloride photographic emulsion containing grains (colloidal silver sulphide) for physical development is processed in a developer lacking bromide but containing a high proportion of sulphite. In this way physical development causes intense blackening without an exposure. This reaction can be heavily retarded by very small quantities of bromide ions. To utilize this retarding action pictorially a small percentage of a more sensitive bromide emulsion was added to the chloride emulsion and produced bromide ions by means of chemical development.

If this emulsion is then exposed to varying volumes of light the following density distribution is obtained:

a) The zones most exposed are completely blackened by chemical development of the silver chloride (negative part of characteristic curve).

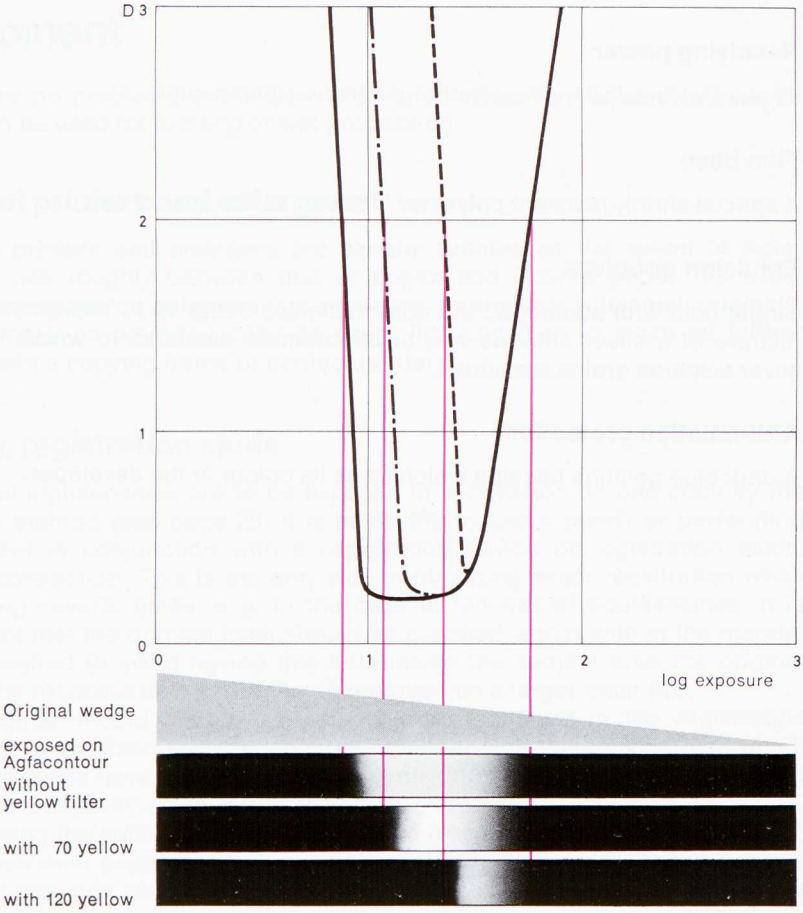
b) The zones given a medium exposure are only slightly blackened. The intensity of the light was not sufficient to achieve chemical development of the silver chloride. On the other hand the more sensitive silver bromide, which is present in the emulsion in only a small quantity, is reduced to silver. The bromide ions thus released prevent physical development of the silver halide (wedge formed by the negative and positive parts of the characteristic curve).

c) In the area where there is no exposure or only a very short one, heavy density forms due solely to physical development of the silver chloride (positive part of characteristic curve).
The equidensity therefore originates in the exposure zone described under b (see Fig. 8).

The density range of the original to be reproduced as an equidensity depends on the speed relationship of the silver bromide and silver chloride. The speed relationship of the two silver halides can be influenced by colour filtering as silver chloride (negative part of characteristic curve) is largely sensitized to green but is less sensitive to white light than the non-colour-sensitive silver bromide which is largely sensitive to blue (responsible for the positive part of the characteristic curve). A higher proportion of yellow in the printing light changes the sensitivity in favour of the silver chloride, and the silver bromide becomes relatively less sensitive. The exposure range between the negative

and positive part of the characteristic curve becomes increasingly narrow, i. e. the width of the equidensity is reduced as the density of the yellow filter increases.
Fig. 8 contains a schematic diagram of the sensitometric relations with Agfacontour, taking into account the yellow filter factors.
By combining a positive and a negative gradation within an emulsion a completely blackened film is obtained with an extreme under- or over-exposure. But it is quite clear from the colour of the silver on the emulsion side of the film whether over- or under-exposure is involved. Only physical blue-black silver can be formed when the exposure is too short. If, on the other hand, the film is over-exposed the entire silver halide undergoes a process of chemical reduction to a brownish black silver. When equidensities have formed both types of silver are contained in the emulsion.

Fig. 8



Photographic properties

Gradation

Extremely hard (gamma above 7.0), the positive gradation usually being rather harder than the negative gradation.

Speed

Lies between contact and enlarging papers. In general the necessary exposure depends on the density of the original to be reproduced as an equidensity.

Resolving power

40 pairs of lines per millimetre (for a narrow equidensity).

Film base

A special shrink-resistant polyester film with a thickness of 180 μ.

Emulsion structure

Single coat with supercoat, the coat thickness being 19 μ. The emulsion is a mixture of a silver chloride and silver bromide emulsion to which colloidal silver sulphide grains are added.

Anti-halation protection

A dark blue gelatine backing which loses its colour in the developer.

Equipment

There are no problems associated with Agfacontour as all the usual equipment can be used for printing or wet processing.

Contact printers and enlargers

Contact printers and enlargers are equally suitable as the speed of Agfacontour lies roughly between that of Lupex and Brovira paper. To avoid longer exposures on enlargers it is advisable, particularly with small originals, first to make an enlarged copy on sheet film und then to make all further copies with a copying frame or contact printer.

Punch, registration studs

If several equidensities are to be exposed in succession on one copy by the additive method (see page 28) it is advisable to use a punch or perforating instrument in conjunction with a registration device or registration studs. in this connection. This is the only way of obtaining exact registration when recopying several times, e. g. in the case of families of equidensities. It is important that the original itself should be punched with a hole in the margin. If it is wished to avoid having this hole inside the subject area the original should be recopied on a larger film or mounted on a larger clear film.
The original should then be inserted before exposure in the registration device or in the fixed registration studs together with the copying film, which should likewise have a hole punched in it. All further printing should be carried out in the same way.
When using the colour development method (see page 31) the hole made with the registration punch facilitates subsequent assembly of the colour separations, particularly where an illuminated viewing surface or retouching desk is not available.

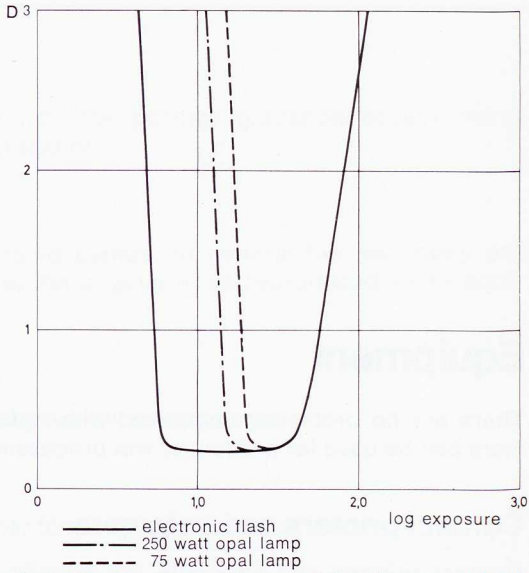
Light sources

Attention must be paid to the colour of the light source in the printer in order to obtain exact results with Agfacontour. It has already been mentioned in the theoretical part of the booklet that the width of an equidensity can be regulated by filters and it will therefore be obvious that the colour temperature of the lamp can also determine the equidensity width. The examples illustrated in this booklet are based in each case on a colour temperature of about 2,600° Kelvin (K) or normal incandescent lighting of the kind frequently used in printers and enlargers. It should, however, be noted that some printers feature a potentiometer for altering the voltage of the lamps, which means that the colour temperature may be variable depending on the voltage set. When the lamps are under-run the colour temperature drops and the proportion of yellow increases, making the equidensities narrower.

Lamps such as Nitraphot, low-voltage or even fluorescent lamps and flashlight resembling daylight produce wider equidensities as a result of the higher proportion of blue or the lower proportion of yellow in the light source. The maximum yellow filter density necessary for the narrowest equidensities will depend on the colour temperature of the light source. The graph in Fig. 9 shows the relationship between equidensity width and colour temperature for various light sources.

Fig. 9

Light sources of different colour temperatures



Step-wedge, densitometer

It is not absolutely necessary to use a step-wedge when working with Agfacontour film but it is of assistance, as in many other printing processes (in reproduction work, for instance, step-wedges are always printed with the original).

A transparent step-wedge (a reproduction wedge from the range of materials for the graphic arts supplied by Agfa-Gevaert) mounted on the negative or positive provides comparative values with which the equidensities can be determined. Exact determination is only possible with a densitometer but practical experience has shown that even estimated values and a little experience are quite sufficient to obtain satisfactory results.

Processing

Darkroom lighting

The orthochromatic sensitization of Agfacontour requires a red darkroom safelight screen such as R 5 dark red or R 3 light red if the film is only exposed to this light for brief periods. The lamp must be arranged at least 30 inches away (15 watt lamp) for direct bench lighting.

Development

A special Agfacontour professional developer in powder form to make 5 litres of working solution is supplied for Agfacontour.

Preparation: Dissolve part A in 3½ litres of water at about 40° C (104° F).

Add part B, stirring continuously, and then make up with water to 5 litres. The developer is ready for use after cooling to 20° C (68° F).

It is not advisable to use a part of the chemicals for preparing the solution as they may not then be present in the correct proportions, possibly due to shaking during transportation.

Working capacity: About 0.25 sq. metres (20–25 sheets 9 x 12 cm) of Agfacontour film can be developed in 1 litre of developer (do not replace used developer in the stock bottle).

Development time: 1½–2 min. at 20° C (68° F) with continuous agitation.

Stop bath

Unlike normal processing of sheet films, Agfacontour definitely needs a 3% acetic acid bath in which the films must be agitated well for 30 seconds. If development is not sufficiently stopped, heavy staining of the emulsion occurs.

Fixing bath, wash, drying

After the stop bath processing proceeds exactly as for black and white sheet films. The film is fixed in Acidofix for 3–5 minutes or in Acidofix Quick for 1½–3 minutes, followed by a wash lasting 15–20 minutes. The film dries more quickly and drying marks are prevented if it is treated in an Agepon after-bath (2 cc Agepon per litre of water). The best method of drying is in a drying cabinet at a temperature not exceeding 40° C (104° F).

Choice of original

Any original, negative or transparency, black and white or colour, can be used for making equidensities. The different density ranges of originals (negatives normally have a much smaller density range than transparencies) call for the use of different yellow filters, particularly in the case of equidensity families.

Low contrast = strong yellow filter, i. e. narrow equidensities.
High contrast = weak yellow filter, i. e. wide equidensities.

In this way the entire density range of the original can be covered by the same number of equidensities.

A method to be preferred, particularly with smaller originals, is first to enlarge them on black and white sheet film (e. g. Agfapan Professional 100). The advantage of such an enlargement is that the exposure is shortened considerably in the case of colour originals, with families of equidensities it increases the accuracy of registration and when big enlargements of the final results are made the equidensity lines are finer.

Masked negatives (e. g. Agfacolor Negative Film CNS) must in any case be recopied onto black and white film (Agfapan 100) otherwise the high proportion of yellow in the mask dye would have an uncontrollable effect on the width of the equidensities and, in an extreme case, no equidensity at all would result.

In any case the question of format depends on magnification of the final enlargement since, with second and third order equidensities, only big enlargement clearly separates the lines from each other and makes them effective from the pictorial viewpoint. The decision to use one of the derivative techniques (which are explained in full on the following pages) requires an exact idea of the final results desired. This is important when choosing the original. A picture with very many small and irregular areas is seldem suitable for equidensity lines as the image does not gain in composition but becomes less clear and therefore less striking in its effect. In this example an equidensity or first order family of equidensities would probably be more suitable as one or two continuous tones could be reproduced in the final enlargement on soft-working material. In this way area coherence is perserved while at the same time rendering the image content abstract.

With colour originals it should be noted that Agfacontour Professional is not sensitive to red and that there is response only to the positive and negative part of the characteristic curve in the case of blue and green. However, this is not usually detrimental with most originals. Only when a very special area is to be reproduced as an equidensity is it necessary first to recopy the colour transparency or negative onto panchromatic black and white film (Agfapan 100).

Preliminary tests with Agfacontour

It is first necessary to become familiarized with Agfacontour, as is the case with every new photographic material. It is therefore advisable to make an initial series of test exposures with a step-wedge or test negative. During subsequent work it will be very easy to arrive at the correct exposure and filtration for the position and width of the equidensities from these test series. The procedure to adopt when making the series of test exposures is as follows:

1st Test: series of exposures with a step-wedge or test negative

The best comparative values are obtained with the step-wedge or, alternatively, a test negative with the greatest possible density range can be used. The exposure for the lowest densities of the original is first determined, preferably by making a series of exposures (a suitable starting exposure for printers has been found to be 1 second, or 5 seconds for enlargers). The correct exposure for the lowest density of the original is very quickly determined with three to four test exposures. For the test series proper exposures are then made, starting with this time and trebling it each time until the highest density of the original is also covered by an equidensity.

2nd Test: series of exposures with different yellow filtering

In the second series the width of the equidensities is varied by yellow filtration. A suitable starting exposure is that for an equidensity of medium density from the first series of test exposures. With the Agfacolor printing filters an increase of 20 yellow filter units in each case is quite sufficient to bring about a perceptible change in the width of the equidensity. Filter units in excess of 100 yellow can lead to over-filtering, depending on the colour temperature of the light source. In an extreme case the film will appear to be completely blackened as the sensitivities for the positive and negative part of the equidensity overlap.

3rd Test: series of exposures on O 81 p or N 51 p

The following additional series of exposures is recommended as a third test. An equidensity, e. g. with a filter density of 150, should be recopied with various exposures on Gevalith Ortho O 81 p or Gevaline N 51 p. It is very easy to recognize how the width of the equidensity alters up to a certain limit as the exposure increases. In each case this limit is the maximum density at the edge of the density trough of the equidensities (see Fig. 7).

Practical examples of graphical composition with Agfacontour

The more important points connected with the principle and processing of Agfacontour Professional Film have so far been mentioned in this booklet. In the following section illustrations are included to show photographers, graphic artists and amateurs with their own darkrooms the great creative latitude offered by Agfacontour. To provide a clearer picture and avoid long-winded repetition the various printing stages will be shown alongside the illustrations.

It has been found in practice that two to three separated equidensities are usually most suitable for black and white graphics. On the other hand, the individual equidensities can be allowed to meet in the case of colour graphics so that black or white gaps between the coloured areas are avoided, depending on the printing method. If these gaps are to be subsequently eliminated a mask can be taken from the mounted family of equidensities and in this way a further colour added to the picture. If the individual equidensities overlap additional equidensities in the appropriate mixed colours are obtained at the points where they overlap.

Black and white graphics

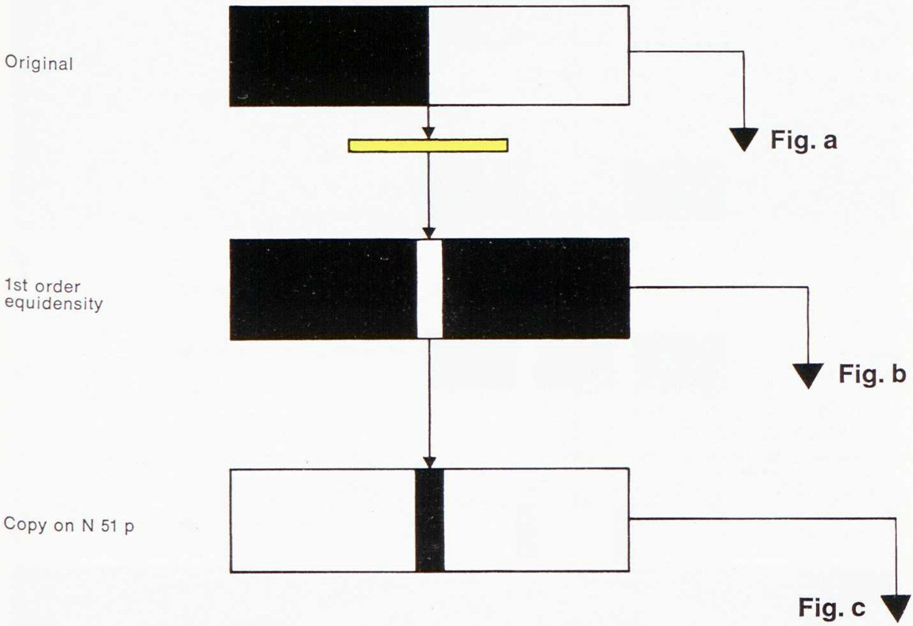
The diagram of the step-wedge shows exactly what happens with various yellow filtrations and exposures. These values should of course only be used as relative figures, as filtration and exposure depend on the light source of the enlarger or printer.

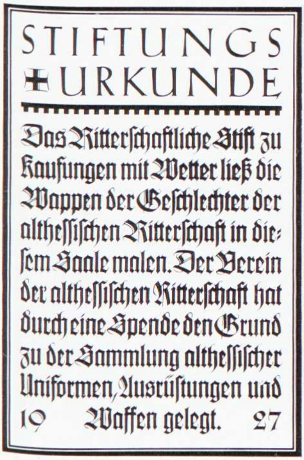
The following procedure results, as shown by the diagram in Fig. 10:

The original (where possible a negative should be used for line originals) is exposed on Agfacontour through a yellow filter (density 50) and is then processed in Agfacontour developer. The first order equidensity obtained can be enlarged directly on Brovira paper. Fine black lines on a white background are then obtained. The film should first be recopied onto N 51 p for negative reproduction of the equidensity (white lines on a black background).

On page 26 2nd order equidensities are obtained from continuous tone originals – in Fig. 11 a black and white negative was used, in Fig. 12 a colour transparency. With the original in Fig. 11 one equidensity was sufficient to illustrate the more important contours. On the other hand, with the original in Fig. 12 a family of equidensities with 3 separations was necessary. If the 1st order equidensities are separated from each other they can be exposed in succession and in register onto an Agfacontour film. If they overlap each equidensity must be exposed onto a separate film.

Fig. 10 Copy of writing and line originals





STIFTUNGS
URKUNDE

Das Ritterschaftliche Stift zu
Kaufungen mit Wetter ließ die
Wappen der Geschlechter der
althessischen Ritterschaft in die-
sem Saale malen. Der Verein
der althessischen Ritterschaft hat
durch eine Spende den Grund
zu der Sammlung althessischer
Uniformen, Ausrüstungen und
19 Waffen gelegt. 27

Fig. a

Fig. b

Fig. c

Fig. 11 2nd order equidensity

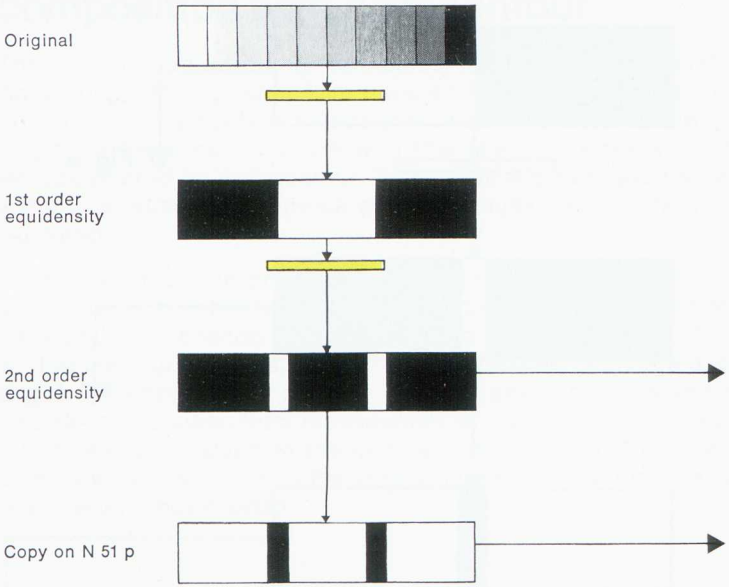
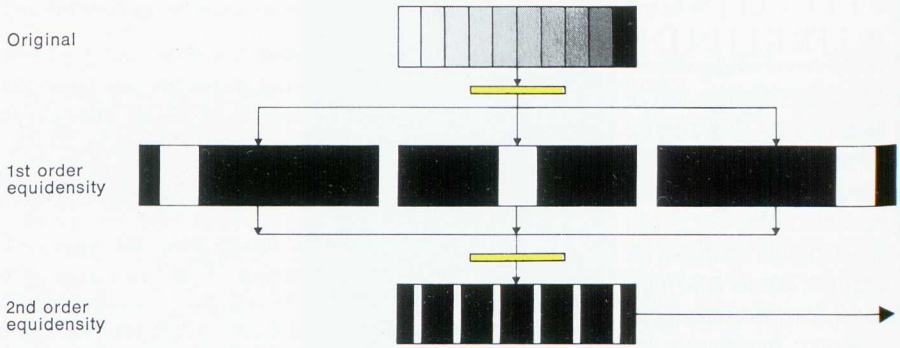
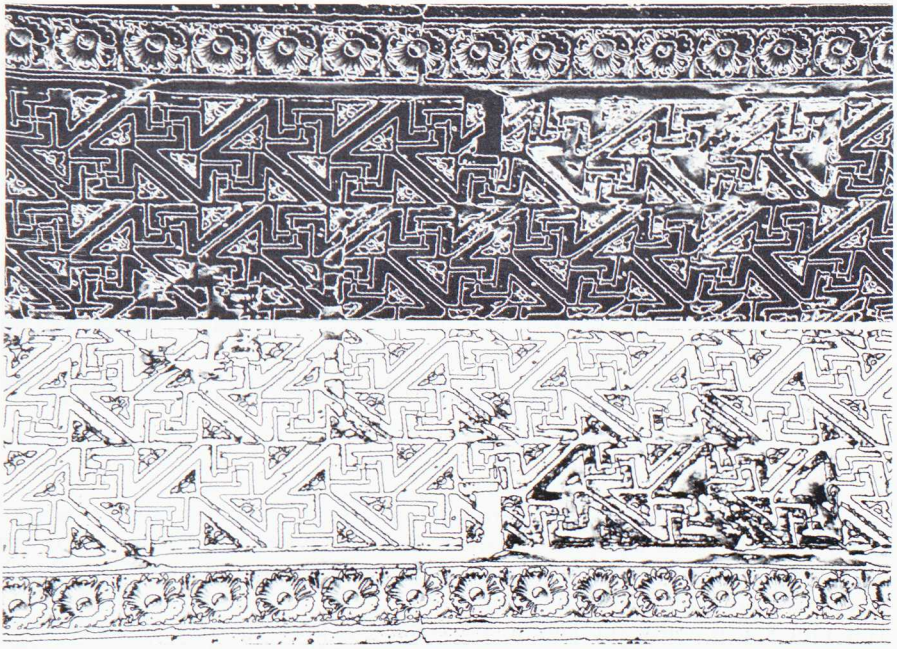
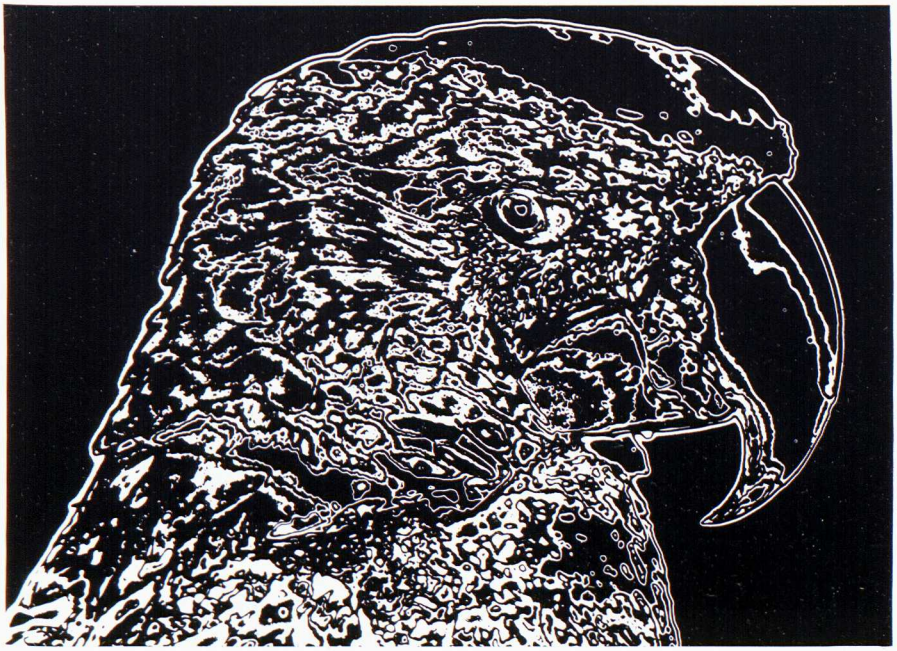


Fig. 12 2nd order family of equidensities







Colour graphics

Equidensity images in colour are just as easy to make as their black and white counterparts. There is a choice of two printing methods which will give the same result using different aids. Depending on the user's experience, and of course the equipment available in the darkroom, the individual equidensity films can be exposed directly in sequence on colour materials using different filtrations, or colour-developed equidensity copies can be arranged in register and exposed like a normal colour negative on paper or film.
The first method, by means of colour filtering, saves time but a registration device is required (a punch, registration studs or some similar device; see page 19). Some experience is needed to achieve good results as the filtration and film have to be changed for each stage of the equidensity. The second method, by means of colour development, lasts rather longer but no additional equipment is needed for it.

Copying with colour filters

The individual equidensity films are copied in succession on colour material using the filter previously established. Suitable filters for this purpose are reproduction separation filters (blue U 438, green L 525, red L 599) with which all colours can be mixed (see table).
The subtractive filters supplied in the Agfacolor printing filter kit can also be used as a substitute but relatively high filter densities are necessary to obtain pure and brilliant colours.
The filters require different exposures due to their different densities and it is therefore advisable, quite apart from avoiding unnecessary calculations with colour mixtures, to reduce the density of the weaker filters with neutral density filters to such an extent that they require roughly the same exposure. Neutral density filters are obtainable from Agfa-Gevaert in the density range 0.1 to 1.0 and in density 2.0.
In the table on page 29 the percentage exposures are stated so that any desired colour can be obtained by additive colour mixture.
When exposures are made with two filters one behind the other (to obtain mixed colours) the total exposure must always be 100 %. The following example explains this.
From one original three equidensity films are made which are to be copied in colour on colour reversal material as follows:

Film 1 in cyan, film 2 in yellow and film 3 in violet. The correct exposures for the blue, green and red filters were determined by a test with 10 seconds each.

Exposures given:

Film 1 5 seconds with blue filter and 5 seconds with green filter
Film 2 5 seconds with red filter and 5 seconds with green filter
Film 3 7 seconds with blue filter and 3 seconds with red filter

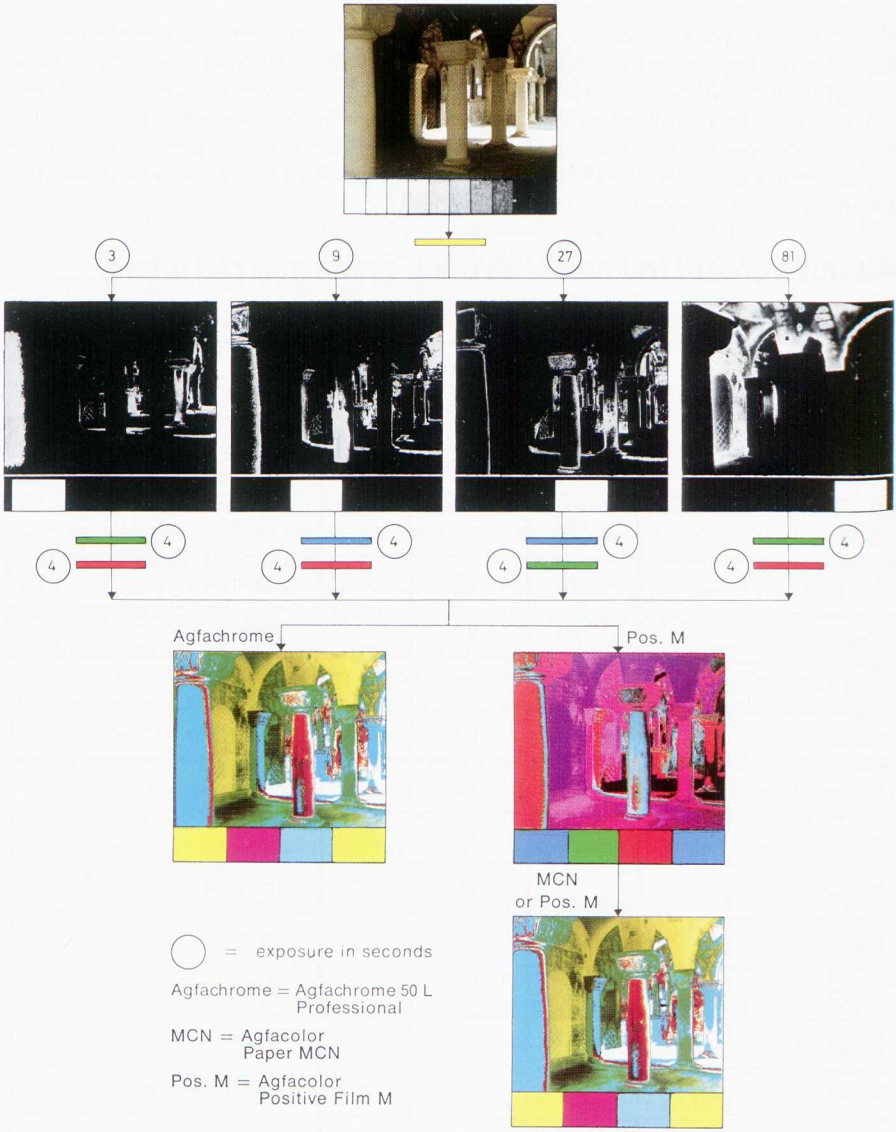
The selected colours then result again when copied in register and no additional correction filtering is necessary. When copied on positive film using the same filters the complementary colours are naturally obtained, which can also be seen from the table. In this case they are red, blue and yellowish green.
In the illustrated example 4 equidensities were made on Agfacontour, 2 of them being copied with a yellow and 1 each with a magenta and cyan filter on Agfacolor reversal material. These colours can of course be varied according to taste. Both the results in our example – colour reversal and positive film – can now be contact-printed or enlarged on the same material, or on Agfacolour Paper MCN 111, the copy on the positive material producing the complementary colours.

Additive colour mixture with blue, green and red filters

Exposures for the individual filters are stated as percentages

Desired colour for exposure on:				
Agfachrome Professional	Colour of printing filter			Agfacolor MCN 111 Agfacolor Positive Film M
	Blue	Green	Red	
Blue	100			Yellow
Ice blue	75	25		Orange
Cyan	50	50		Red
Sea green	25	75		Carmine
Green		100		Magenta
Yellowish green		75	25	Violet
Yellow		50	50	Blue
Orange		25	75	Ice blue
Red			100	Cyan
Carmine	25		75	Sea green
Magenta	50		50	Green
Violet	75		25	Yellowish green
Blue	100			Yellow

Fig. 13 Copying method with colour filtering



Copying method with colour development

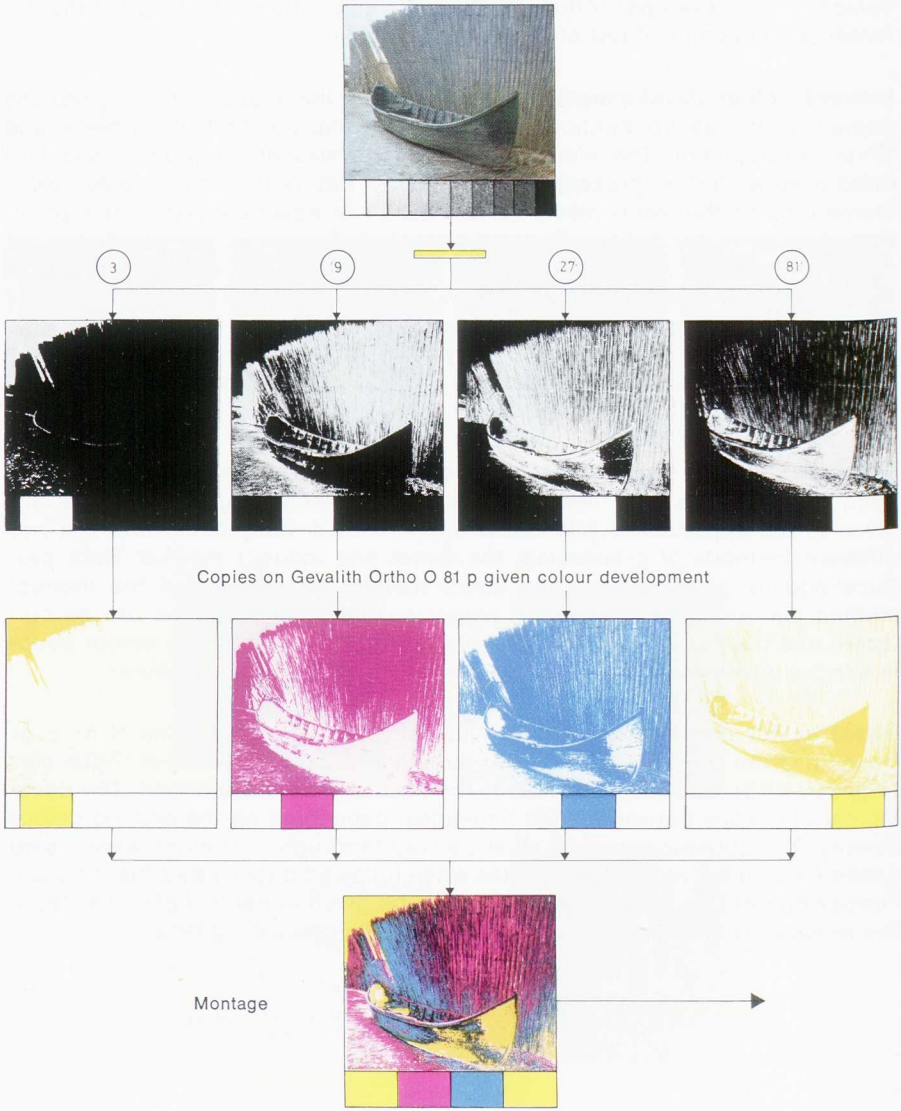
As in the previous example, 4 equidensities are exposed on Agfacontour. These films are each copied three times on Gevalith Ortho O 81 p. These films are given colour development so that yellow, magenta und cyan separations are obtained. Further colours can be produced by mixing the couplers dissolved in the developer. After combining the colours by montage many different colour compositions are possible.

Indirect colour development: By this method the equidensity separations copied on the above-mentioned graphic arts film are first given black and white development. The films should then be washed thoroughly and first dried or given further processing immediately. Before the actual colour development starts the film is bleached and the silver again converted to a sensitive silver compound. This silver halide only has very low sensitivity to light and it is therefore possible to work in white light. A suitable bleach bath is the one used in the Agfacolor negative process. N. B. Do not use bleach-fix bath. After the bleaching process the image has a milky white appearance and the film must be washed thoroughly for at least 15 minutes otherwise fogging will result. Further processing is given in the same way as for direct colour development.

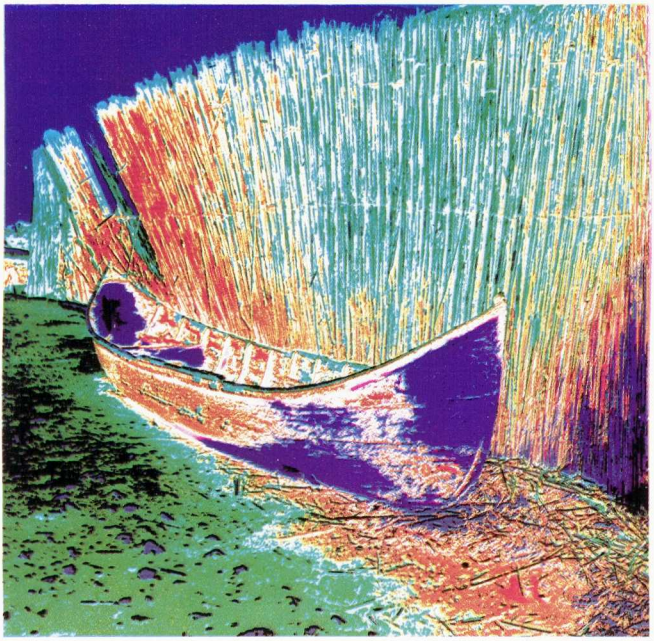
Agfa-Gevaert can supply the colour couplers on request (yellow-red-blue, each packed in ten 1 g units). Instructions for preparing the couplers are given in the appendix to this booklet. In colour development there are two different methods of processing, the direct and indirect method. Both produce equally good results. The direct method is quicker but the indirect method has the advantage that a bigger number of separations can be collected and then developed together or in quick succession with colour couplers in the developer which keeps for only a short time (about 2 hours).

Direct colour development: The equidensity copies on Gevaline N 51 p or Gevalith Ortho O 81 p are developed directly in a colour developer (Agfacolor Negative NPS) to which couplers for the desired colour are added. The development time lies between 3 and 5 minutes, depending on the desired colour density. The subsequent wash must be very thorough, 2 minutes when using a stop-fix bath but at least 10 minutes when followed directly by a bleach bath. Further processing after development can be given either in Agfacolor negative or paper chemicals (see table in appendix for processing times).

Fig. 14 Copying method with colour development



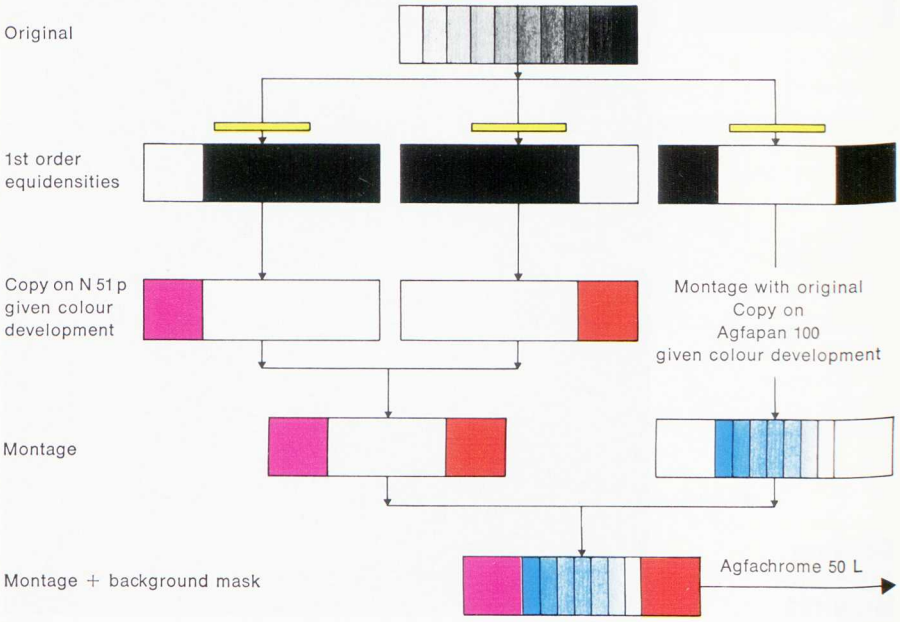
Copy on
Agfachrome 50 L
Professional



Copy on
Agfacolor
MCN 111

After showing the most important methods used for producing colour pictures with Agfacontour – method using colour filters, colour development – let us consider various possibilities for composition with Agfacontour by means of diagrams, as in the case of black and white graphics.
An optimum pictorial effect can be obtained by combinations of lines with continuous tones, first and second order families of equidensities, overlapping equidensities or screen images, provided a suitable original and the correct colour scheme is chosen.
If subsequent gaps (white or black sections in the image) are to be removed between the various separations in the case of families of equidensities a mask is taken from the family either mounted or exposed on a film. The mask obtained by the "colour copying method" is coloured and mounted with the film pack. However, when using colour filters the various equidensities are exposed without colour filters onto N 51p. The mask formed in this way is copied together with the equidensities in a given colour onto the final enlargement.
The particulars of filters and exposure in Figure 17 on page 36 are intended to show the values used on the average for colour graphics but, as already stated, these values depend on the type of light source used in the printer.

Fig. 15 Combination of lines and continuous tone



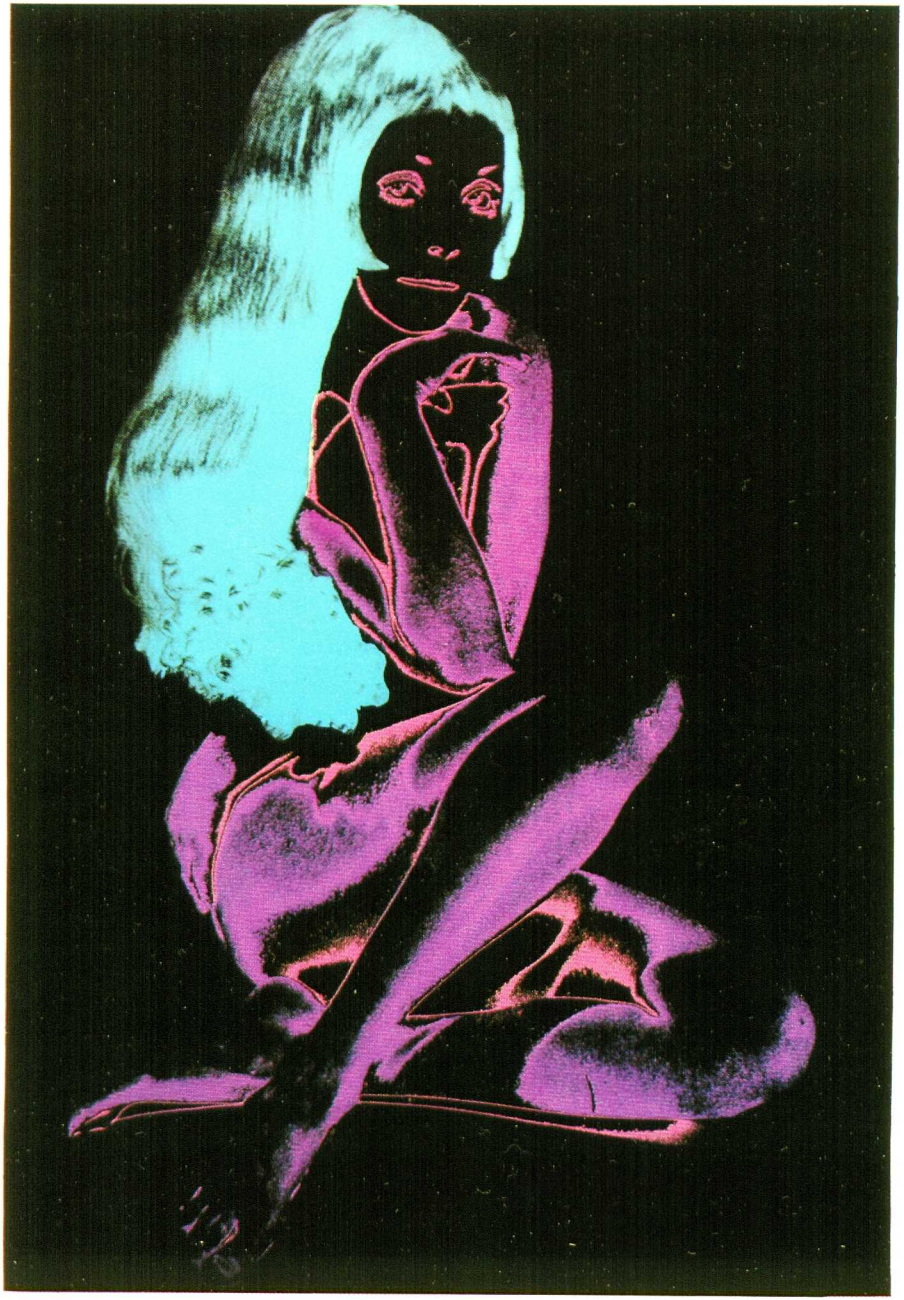


Fig. 16 1st order family of equidensities

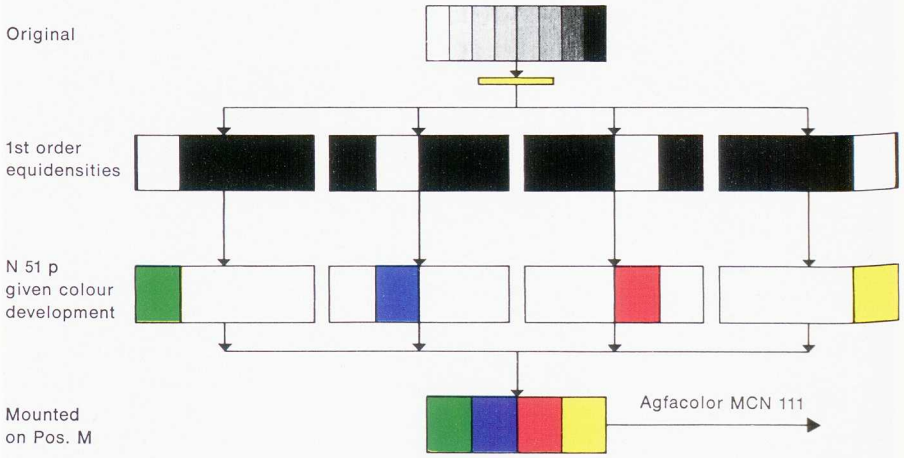
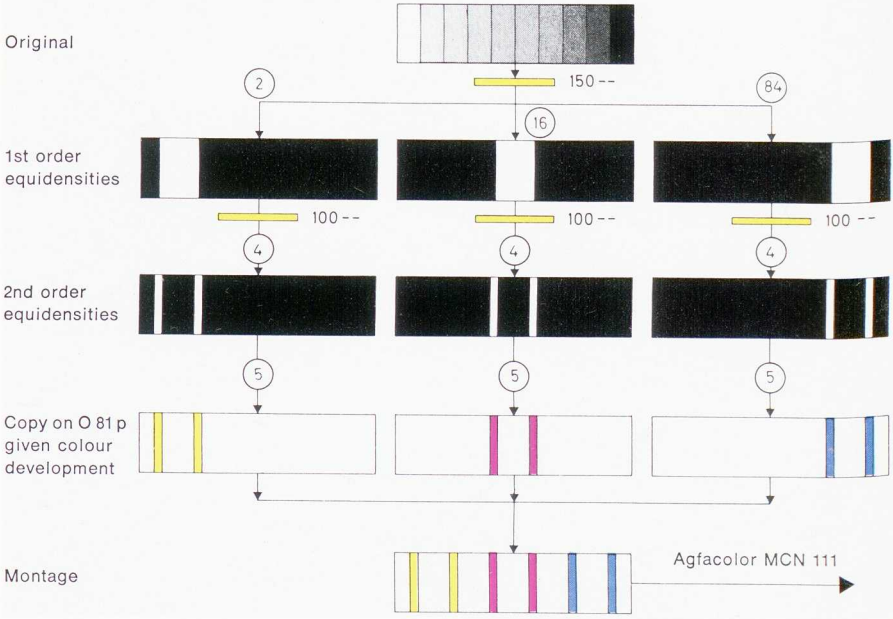


Fig. 17 2nd order family of equidensities



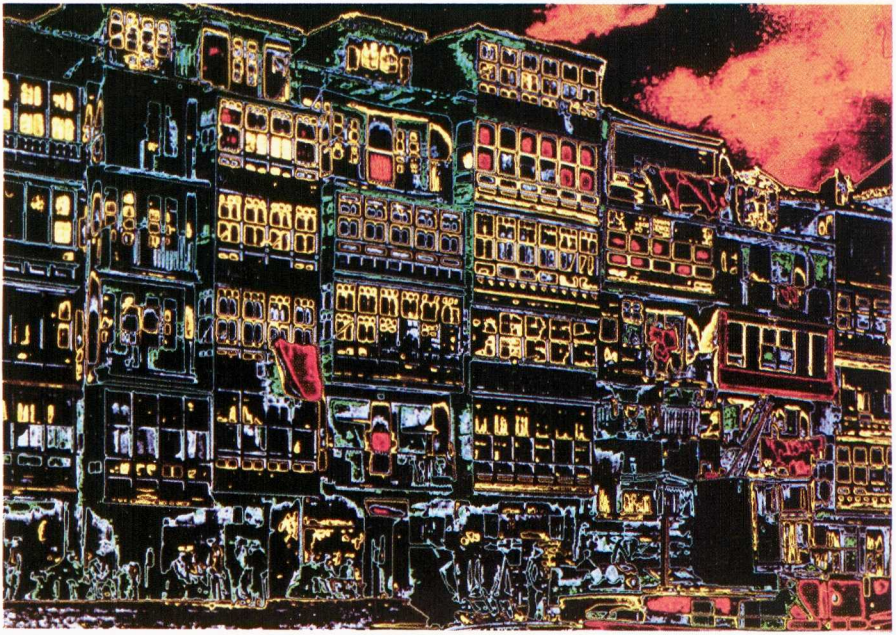


Fig. 18 Overlapping equidensities

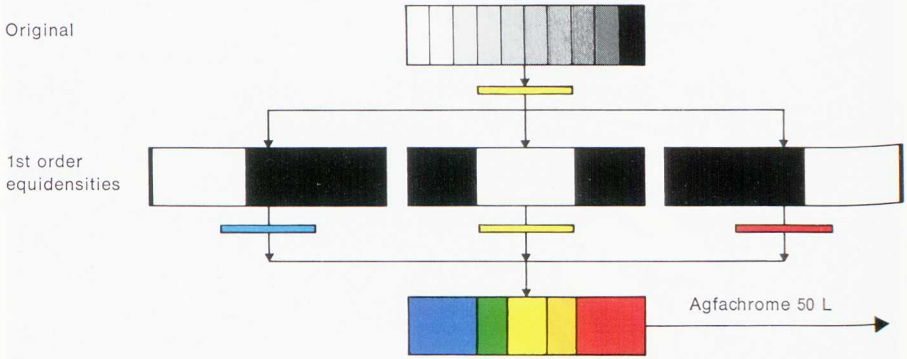
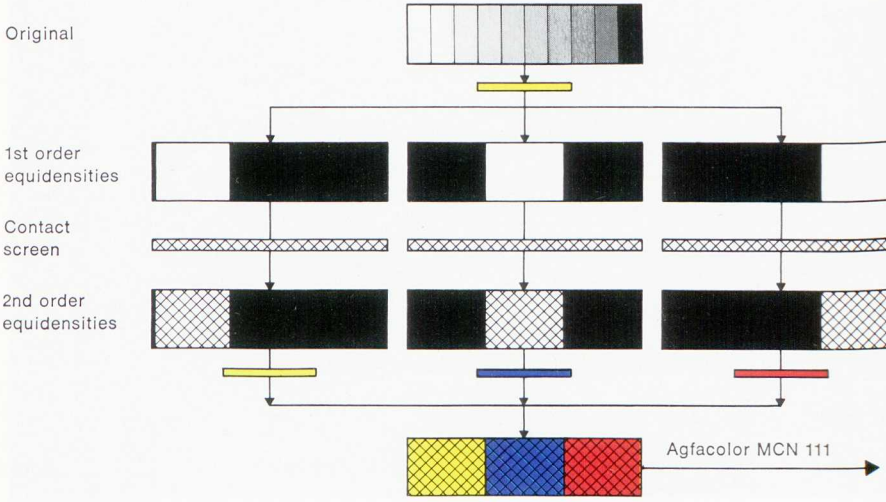
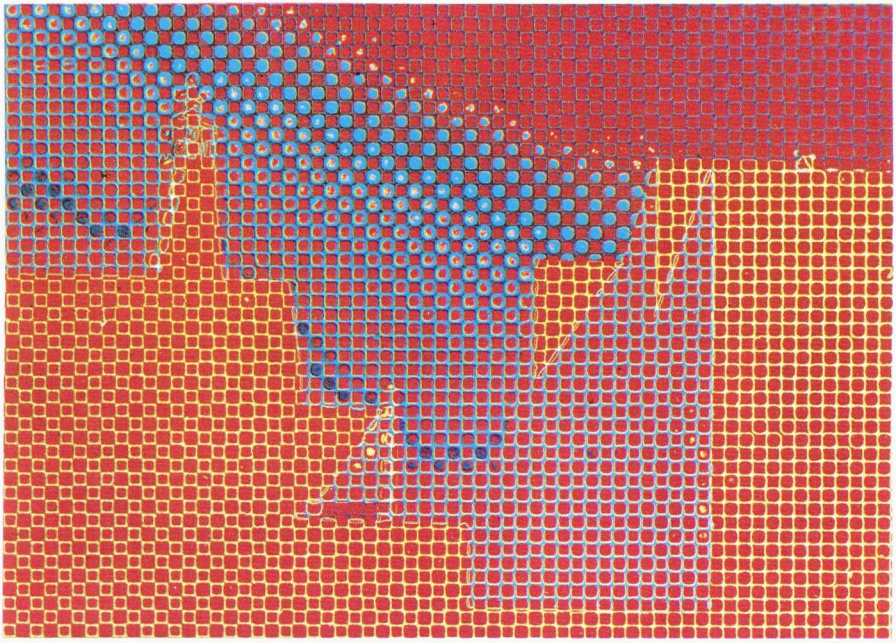


Fig. 19 Screen images with Agfacontour



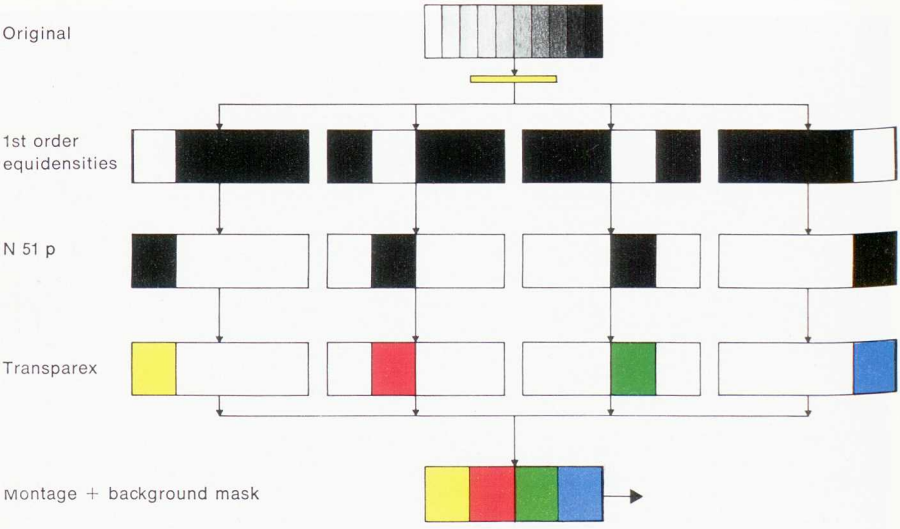


Rapid processing with Transparex film

Transparex film is a monochrome colour film on a polyester base supplied in the colours red, orange, yellow, green, blue, violet, black and opaque white. It can be exposed in any thermographic printing equipment in full daylight and developed in tap water. A positive copy is obtained without any intermediate stages. Since the film itself cannot absorb water it dries in a few seconds. Line originals of all kinds can be copied on Transparex film but it is not possible to reproduce continuous tones. Either transparent or opaque originals can be used so that equidensities can be recopied on film or hard paper before being exposed on Transparex. The finished Transparex films are afterwards arranged in register and possibly copied on Agfacolor paper or Positive Film M. The exact procedure is illustrated in Figure 20.

Mixed colours can be produced in addition to the colours mentioned above by making two different Transparex copies from one equidensity.

Fig. 20 Example using Transparex



APPENDIX

Processing table for Agfacolor paper

Bath	Code	20° C process		25° C process	
		° C	min.	° C	min.
Agfacolor paper developer	Pa I 60	20±0.3	5	25±0.3	3
Wash		14 – 20	2.5	15 – 25	$1^{3}/_{4}$
Agfacolor stop-fix bath	PPa II/K	18 – 20	5	18 – 25	$1^{3}/_{4}$
Agfacolor bleach-bix bath	PPa III/K	18 – 20	5	23 – 25	$3^{1}/_{2}$
Wash (thorough)		14 – 20	10	15 – 25	$5^{1}/_{4}$
Stabilizing bath with formalin	Pa VIS	18 – 20	$2^{1}/_{2}$	18 – 25	$1^{3}/_{4}$
Total processing time			**30 min.**		**17 min.**

Processing of Gevalith Ortho O 81p and Gevaline N 51p

Both materials are high-contrast films for making line and screen negatives. Their very thin base (0.085 mm) makes them highly suitable for montage purposes. Under standard reproduction processing the films are processed in Gevaline G 7 p for 3 to 4 minutes. The Agfa-Gevaert positive developer Neutol liquid NE can also be used successfully in conjunction with indirect colour development. Processing times are 2 to 3 minutes in the developer, 30 seconds in the stop bath, 5 minutes in the fixing bath and 20 minutes in the final wash.

Processing table: Colour development

Bath	Code	Processing times in minutes	
		Direct development	Indirect development
Agfacolor bleach bath	N II		6
Wash			10
Agfacolor film developer + colour coupler	NPS	3–6	3–6
Wash		10	10
Agfacolor bleach bath	N II	5	5
Agfacolor fixing bath	N III	5	5
Final wash		10	10
Agepon after-bath		1	1

* Agfacolor Bleach-Fix Bath K (PPa III K) can be usd instead of Agfacolor Bleach and Fixing Bath following colour development.

Instructions for preparing yellow, red (magenta) and blue (cyan) colour couplers

a) Yellow colour coupler
Dissolve 1 g of the yellow coupler in about 100 cc Agfacolor film developer S and add water to this solution to make 1 litre.

b) Red colour coupler
Paste up 1 g of the red coupler in about 10 cc methyl alcohol, preferably in a test tube, and then dissolve in 2–5 cc dilute caustic soda solution (1 n or 5 %), stirring with a glass rod. The dissolved red coupler should be poured into 1 litre Agfacolor film developer S, stirring well.

c) Blue colour coupler
Dissolve 1 g of the blue coupler as described under b).

Intermediate colours can also be obtained by mixing suitable colour couplers dissolved in the developer, e. g. red-orange shades by mixing developer solution containing yellow or red couplers.
The fixing process following the first wash was introduced so that it is possible to see, at an early stage in processing, whether the correct exposure has been given. If it is not necessary to know this the fixing operation can be omitted.
During washing films should not be in contact, particularly films of different colours, as the colours are not completely retained by the film and may mark off onto films of another colour.
Development can of course be adapted to various requirements both as regards the amount of coupler added and development time. The figures given should only be regarded as a guide.
Developer solutions containing couplers do not keep for long and should therefore be freshly prepared immediately before using them. It should also be noted that light fastness of the developed dyes is limited.

Processing of Agfacolour Positive Film M

Bath	Code	20° C process	
		°C	min.
Agfacolor paper developer	Pa I 60	20 ± 0,5	8
Wash		14 – 20	2,5
Agfacolor stop-fix bath	PPa II/K	18 – 20	5
Agfacolor bleach-fix bath	PPa III/K	18 – 20	10
Final wash		14 – 20	10
Wetting agent *		18 – 20	1

* Agepon (1 + 200) with an addition of formalin (15 cc 30 % per liter)

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